SECTION 404(b)(1) EVALUATION

Bendway Weir Construction – Mississippi River
At Bend of Island 25 (River Mile 803L AHP),
Lauderdale County, Tennessee
And
At Reverie (River Mile 767R AHP),
Tipton County, Tennessee

I. PROJECT DESCRIPTION

a. Location. The proposed bendway weir construction at the Bend of Island 25 is located along the left descending bank of the Mississippi River between River Miles 804L above head of passes (AHP) and 802L AHP in Lauderdale County, Tennessee. The proposed bendway weir construction at Reverie is located along the right descending bank of the Mississippi River between River Miles 767R AHP and 765R AHP in Tipton County, Tennessee.

b. General Description. The work at Bend of Island 25 (~ River Mile 803L AHP) will involve placement of approximately 400,000 tons of Graded Stone A in seven bendway weirs. The bendway weirs will extend riverward from the left descending bank and vary from 600 to 700 feet in length. The top widths of the bendway weirs will be approximately 6 feet, and the bottom widths will be approximately 50 to 70 feet depending on river bottom configurations at the time of placement. Riverbank paving will include the placement of a total of approximately 75,000 tons of 250 LB Riprap on top of the existing articulated concrete mattress (ACM) for bank protection at the weirs. The work at Reverie (~ River Mile 767R AHP) will involve the placement of approximately 400,000 tons of Graded Stone A in twelve bendway weirs. The bendway weirs will extend riverward from the right descending bank and vary from 500 to 800 feet in length. The top widths of the weirs will be approximately 6 feet, and the bottom widths will be approximately 50 feet depending on river bottom configurations at the time of placement. Riverbank paving will include the placement of a total of approximately 40,000 tons of 250 LB Riprap on top of existing ACM for bank protection at the weirs.

No bank grading or excavation of material will be required to tie the weirs into the riverbank. In order to ensure the integrity of each weir, rock paving would extend from approximately 50 feet upstream to approximately 150 feet downstream of the weir centerline. The tops of all weirs would be constructed to an elevation of 20 feet or more below the Low Water Reference Plane (i.e. -20 LWRP or lower). The LWRP is a computed water surface elevation profile based on low discharge statistics for a long period of daily gage records (i.e. the 97 percent exceedance discharge over a 20-year period of record). In other words, there would be at least 20 feet or more of water over the tops of the weirs even at low river stages to ensure safe navigation.

c. Authority and Purpose. The project is authorized by the Flood Control Act of 15 May 1928, Public Law No. 391-70, as amended and supplemented by subsequent Acts of Congress. This Act authorized the Mississippi River and Tributaries (MR&T) Project, which included channel improvement and stabilization works for stabilizing the channel to provide an efficient

navigation alignment and protection of flood control features in the Lower Mississippi River. The purpose of this project is to create a safer navigation channel for towboats in the Mississippi River by reducing the strong drafting currents that presently exist.

d. General Description of Dredged and /or Fill Material.

(1) General Characteristics of Fill Material. Fill material will consist entirely of limestone rock. Graded Stone A will be used for construction of the weirs, and 250 LB Riprap stones will be used for bank protection where the weirs will tie into the existing ACM. Size requirements for Graded Stone A and 250 LB Riprap are shown below:

GRADED STONE A	
Stone Weight (LBS)	Cumulative % Finer by Weight
5000	100
2500	70-100
500	40-65
100	20-45
5	0-15
1	0-5

250 LB RIPRAP	
Stone Weight (LBS)	Cumulative % Finer by Weight
250	100
75	30-100
25	10-50
6	0-15

(2) Quantity of Material. The work at Bend of Island 25 will involve placement of approximately 400,000 tons of Graded Stone A in seven bendway weirs and placement of a total of approximately 75,000 tons of 250 LB Riprap on top of the existing ACM for bank protection at the weirs. The work at Reverie will involve the placement of approximately 400,000 tons of Graded Stone A in five bendway weirs and placement of a total of approximately 40,000 tons of 250 LB Riprap on top of existing ACM for bank protection at the weirs.

(3) Source of Material. The Graded Stone A and 250 LB Riprap will be obtained from quarries producing stone which meets USACE specifications.

e. Description of Proposed Discharge Sites.

(1) Location. Seven bendway weirs will be constructed at the Bend of Island 25 extending riverward from the left descending bank of the Mississippi River between River Miles 804L and 802L in Lauderdale County, Tennessee. Five bendway weirs will be constructed at Reverie extending riverward from the right descending bank of the Mississippi River between River Miles 767R and 765R in Tipton County, Tennessee.

(2) Size. At the Bend of Island 25, the proposed bendway weirs will vary from 600 to 700 feet in length, will be approximately 6 feet in top width, and will be approximately 50 to 70 feet in bottom width, depending on river bottom configurations at the time of placement. At Reverie, the proposed bendway weirs will vary from 500 to 800 feet in length, will be approximately 6 feet in top width, and will be approximately 50 feet in bottom width, depending on river bottom configurations at the time of placement.

(3) Type of Habitat. The bendway weirs will be placed in the swift currents along two outside bends in the Lower Mississippi River. The weirs will tie into the existing ACM along these outside bends, will extend riverward along the primarily sand river bottom, and will remain at least 20 feet or more underwater even at low river stages.

(4) Timing and Duration of Discharge. The proposed construction would last approximately 50 days for each project location (100 days total). Construction is typically conducted during the low water season extending from August through December.

f. Description of Disposal Method. Barge mounted draglines equipped with rock buckets will pull stone from floating barges into the river at the construction sites.

II. FACTUAL DETERMINATION

a. Physical Substrate Determinations.

(1) Substrate Elevation and Slope. There will be an immediate change in substrate elevation and slope over the areal extent of the structures. The bendway weirs will consist of a rock mound of uniform shape extending from the existing ACM along the outside bends into the navigation channel. Sediment will be captured between the underwater weirs raising the channel depth along these outside bends; however, the elevation of the bendway weirs and associated trapped sediments will remain at a -20 LWRP allowing for passage of barge traffic even during low river stages. A small portion of the encroaching point bars will be removed as the currents shift away from the revetted banks along these two outside bends.

(2) Sediment Type. The project sites are located entirely within the existing channel of the Mississippi River. The Lower Mississippi River channel is comprised mainly of gravel, sands, silts, and clays. The stone used for the bendway weir construction will be Graded Stone A and 250 LB Riprap.

(3) Dredged and Fill Material Movement. No bank grading or excavation is required for the installation of the bendway weirs. Draglines will pull rock from floating barges into the river to construct the weirs. Extreme high flows may cause some potential scour and dike stone to be dislodged from the structures in the future resulting in a need for minor repairs; however, no major failures are likely to occur.

(4) Physical Effects on Benthos. Due to the high velocities and shifting substrate along the outside bends, few or no mussels are likely to inhabit the project locations or be affected by construction. The existing revetted banks are most likely colonized by high densities of hydropsychid caddisflies. Low densities of chironomids, oligochaetes, amphipods, and nematodes most likely inhabit the sandy substrate along the river bottom. During construction, many of the macroinvertebrates in the immediate vicinity of the project are expected to drift downstream. High densities of hydropsychid caddisflies would be expected to quickly colonize the large limestone rocks comprising the bendway weirs after construction. Benthic fish would temporarily shift upstream or downstream during construction. Greater utilization of the project

locations by benthic fishes are expected after construction due to the expected increase in densities of macroinvertebrates.

(5) Other Effects. N/A

(6) Action Taken to Minimize Impacts. Construction of the bendway weirs will be carefully planned and executed. Contractors are required to maintain proper alignment of the weir structures. The fill material is clean limestone rock; thus, there will be minimal wash resulting from the placement of the stones. Contractors are also responsible for an approved environmental protection plan for the prevention/control of pollution and habitat disruption that may occur to the environment during construction.

b. Water Circulation, Fluctuation, and Salinity Determination.

(1) Water.

(a) Salinity. N/A

(b) Water Chemistry. No expected change.

(c) Clarity. Some sediments (mostly sands) will be stirred up when the rocks comprising the bendway weirs are deposited onto the riverbed. This increased sediment load will be local and minor compared to the natural sediment load of the river, especially during high river stages.

(d) Color. No expected change.

(e) Odor. No expected change.

(f) Taste. No expected change.

(g) Dissolved Gas Levels. No expected change.

(h) Nutrients. No expected change.

(i) Eutrophication. No expected change.

(j) Others as Appropriate. N/A

(2) Current Patterns and Circulation.

(a) Current Patterns and Circulation. With the installation of the bendway weirs, secondary currents which are currently directed downward thus deepening the channel and depositing sediment onto the encroaching point bars will be redirected. The weirs would eventually remove a small part of the edge of the sand bar that is encroaching from across the river. This would widen the channel and reduce the swift currents along the toe of the revetted

riverbanks. Sediments will be deposited between the bendway weirs rather than building up on the encroaching point bars.

(b) Velocity. The bendway weirs will redirect the swift currents away from the outside riverbanks allowing for a wider and safer navigation channel.

(c) Stratification. No expected change.

(d) Hydrologic Regime. No expected change.

(3) Normal Water Level Fluctuations. The bendway weirs will have no discernible effects on normal water level fluctuations or overall river stages.

(4) Salinity Gradients. N/A

(5) Action Taken to Minimize Impacts. Construction of the bendway weirs will be carefully planned and executed. Contractors are required to maintain proper alignment of the weir structures. The fill material is clean limestone rock; thus, there will be minimal wash resulting from the placement of the stones. Contractors are also responsible for an approved environmental protection plan for the prevention/control of pollution and habitat disruption that may occur to the environment during construction.

c. Suspended Particulate/Turbidity Determination.

(1) Expected Changes in suspended Particulates and Turbidity Levels in Vicinity of Disposal Sites. Some sediments (mostly sands) will be stirred up when the Graded Stone A and 250 LB Riprap are first deposited onto the riverbed and existing ACM. This increased sediment load will be local and minor compared to the natural sediment load of the river, especially during high river stages.

(2) Effects on Chemical and Physical Properties of the Water Column.

(a) Light Penetration. The temporary increase in turbidity during construction will be minor and not detectable from the surface. The proposed project will have no effect on light penetration.

(b) Dissolved Oxygen. No change is expected.

(c) Toxic Metals and Organics. No change is expected.

(d) Pathogens. N/A

(e) Aesthetics. The bendway weirs will remain underwater at all times. A small portion of the encroaching point bars will be removed resulting in a wider navigation channel during low water stages.

(f) Others as Appropriate. None noted.

(3) Effects on Biota.

(a) Primary Production. The proposed work should have no distinguishable effects on primary productivity in the Lower Mississippi River.

(b) Suspension/Filter Feeders. Due to the high velocities and shifting substrate along the outside bends, few or no freshwater mussels are likely to inhabit the project locations or be affected by construction. Some benthic macroinvertebrates inhabiting the river bottom and existing ACM along the outside bends may drift downstream as rock is being deposited. Benthic macroinvertebrates are expected to quickly colonize the stones comprising the bendway weirs after construction, particularly hydropsychid caddisflies.

(c) Sight Feeders. Resident fish are adapted to turbidity increases that occur with high water events. Project-related turbidity increases will be minor compared to these natural events. Since fish and other sight feeders are highly mobile, project impacts to sight-feeding organisms will be insignificant and short term.

(4) Actions Taken to Minimize Impacts. Construction of the bendway weirs will be carefully planned and executed. Contractors are required to maintain proper alignment of the weir structures. The fill material is clean limestone rock; thus, there will be minimal wash resulting from the placement of the stones. Contractors are also responsible for an approved environmental protection plan for the prevention/control of pollution and habitat disruption that may occur to the environment during construction.

d. Contaminant Determinations. It is not expected that any contaminants will be introduced or translocated due to construction.

e. Aquatic Ecosystems and Organism Determination.

(1) Effects on Plankton. Effects, if any, on plankton communities are expected to be insignificant and of short duration.

(2) Effects of Benthos. Due to the high velocities and shifting substrate along the outside bends, few or no mussels are likely to inhabit the project locations or be affected by construction. The existing revetted banks are most likely colonized by high densities of hydropsychid caddisflies. Low densities of chironomids, oligochaetes, amphipods, and nematodes most likely inhabit the sandy substrate along the river bottom. During construction, many of the macroinvertebrates in the immediate vicinity of the project are expected to drift downstream. High densities of hydropsychid caddisflies would be expected to quickly colonize the large limestone rocks comprising the bendway weirs after construction. Benthic fish would temporarily shift upstream or downstream during construction. Greater utilization of the project locations by benthic fishes are expected after construction due to the expected increase in densities of macroinvertebrates.

(3) Effects on Nekton. Nekton will be temporarily displaced during construction, but will return shortly after project completion. Greater utilization of these two river reaches by benthic fishes may occur after construction due to the expected increase in densities of hydropsychid caddisflies associated with the structures.

(4) Effects on Aquatic Food Web. Temporary reductions in benthic and suspension/filter communities and drift from such a small area should not significantly impact the aquatic food web. These organisms will quickly colonize the area after construction.

(5) Effects on Special Aquatic Sites.

(a) Sanctuaries and Aquatic Sites. N/A

(b) Wetlands. There are no wetlands within the Mississippi River channel in the vicinity of the project. Thus, there would be no impacts to wetlands.

(c) Mud Flats. NA

(d) Vegetated Shallows. N/A

(e) Riffle and Pool Complexes. None exist within the project area.

(6) Threatened and Endangered Species. There are no sandbars or interior least tern nesting colonies along the two outside bends where the underwater weirs would be installed. Since all work would be done from floating barges, there would be minimal impact to any terns that may decide to feed along the revetted bank. Recent records have shown that least terns have nested in the vicinity of the two project locations on sandbars across the river. The small portions of the two point bars that will eventually wash away once the weirs are installed are expected to be less than 15 percent of the entire areas of each of these two large sandbars. The sandbars would still contain ample least tern nesting area following project construction. The overall population of the least tern would not be affected on the Lower Mississippi River. The proposed project is not likely to adversely impact the least tern. Habitat studies have been variable, but there are indications that pallid sturgeon may prefer areas of swift water with steep configurations (e.g. around dike tips). The proposed underwater weirs would provide habitat conditions with steep configurations along the riverward ends of the weirs, and pallid sturgeon would continue to utilize these river reaches after construction. The proposed project is not likely to adversely impact pallid sturgeon. The swift river currents and shifting substrate along outside bends of the Mississippi River are not conducive habitat for the fat pocketbook pearly mussel. Furthermore, it is highly unlikely that any mussels would be found at the weir sites. The proposed project is not likely to adversely impact fat pocketbook pearly mussels. The U.S. Fish and Wildlife Service (USFWS) has been coordinated with, and requirements of Section 7 of the Endangered Species Act (ESA) have been fulfilled. However, obligations under Section 7 of the ESA will be reconsidered if new information reveals that the proposed action may affect listed species in a manner or to an extent not previously considered, the proposed action is

subsequently modified to include activities which were not considered during this review, or new species are listed or critical habitat designated that might be affected by the proposed action.

(7) Other Wildlife. Since all work would be done from barges floating in the river, there would be no significant adverse impacts to terrestrial wildlife.

(8) Actions Taken to Minimize Impacts. Construction of the bendway weirs will be carefully planned and executed. Contractors are required to maintain proper alignment of the weir structures. The fill material is clean limestone rock; thus, there will be minimal wash resulting from the placement of the stones. Contractors are also responsible for an approved environmental protection plan for the prevention/control of pollution and habitat disruption that may occur to the environment during construction.

f. Proposed Disposal Site Determinations.

(1) Mixing Zone Determination. N/A

(2) Compliance with Applicable Water Quality Standards. An Aquatic Resource Alteration Permit (Section 401 water quality certification) has been requested from the State of Tennessee.

(3) Potential Effects on Human Use Characteristics.

(a) Municipal and Private Water Supply. N/A

(b) Recreational and Commercial Fishing. Fishing should not be affected by the proposed work.

(c) Water Related Recreation. N/A

(d) Aesthetics. The bendway weirs will remain underwater at all times; thus, no changes are expected.

(e) Parks, National Historical Monuments, National Seashore, Wilderness Areas, Research Sites and Similar Preserves. No sites exist within the footprint of the proposed project. However, the agricultural field immediately adjacent to top-bank at the Bend of Island 25 project location has been identified as an approved acquisition boundary for the Chickasaw National Wildlife Refuge (NWR). Although not a purpose of this project, the proposed bendway weirs at the Bend of Island 25 would aid in preventing scour along the toe of the existing revetment and potential erosion into these lands due to the swift currents along this sharp and narrow bend in the river.

g. Determination of Cumulative Effects on the Aquatic Ecosystem. The Lower Mississippi River has been converted from a naturally meandering river channel of the past to a more controlled channel containing various river training structures and other navigation and flood control features that are present today. Following the disastrous flood of 1927, the Flood Control

Act of 1928 was passed committing the Federal Government to a definite program of flood control, channel stabilization, and river regulation, known as the Mississippi River and Tributaries (MR&T) Project. The MR&T project has four major features: 1) levees and floodwalls for flood protection, 2) floodways to divert excess flows past critical reaches, 3) channel improvement and stabilization for both navigation and flood control, and 4) tributary basin improvements for flood protection and drainage. The MR&T project is primarily responsible for the physical, hydraulic, and ecological features that presently exist in the Lower Mississippi River. Construction of the existing MR&T project has continued throughout ensuing years and will continue throughout the near future. Dikes, revetments, and bendway weirs found throughout the Lower Mississippi River have resulted in a mosaic of artificial and natural habitats utilized by aquatic organisms and wildlife. The construction of these bendway weirs will add to this mosaic of habitats. Levee construction has greatly reduced the amount of seasonally inundated floodplain throughout the region. Additionally, keeping the channel from naturally meandering has reduced the formation of new slackwater habitats in the floodplain. These activities protect approximately 4 million people from flooding, have prevented $353.6 billion in flood damages since 1928, and save $2.9 billion in annual transportation benefits. In recent years, the Memphis District has held annual interagency channel improvement project review meetings with the USFWS and other wildlife resource agencies from Missouri, Arkansas, Kentucky, Tennessee, and Mississippi to discuss past, present, and future channel improvement work within the Memphis District. These meetings result in the development and incorporation of environmental measures, such as dike notching and other strategic alterations into the channel improvement work in order to help conserve, protect, and/or enhance fish and wildlife resources, often outside of the main channel, while continuing to maintain navigation safety and standards.

h. Determination of Secondary Effects on the Aquatic Ecosystem. N/A

III. FINDING OF COMPLIANCE FOR MISSISSIPPI RIVER BENDWAY WEIR CONSTRUCTION AT BEND OF ISLAND 25 AND REVERIE

a. No significant adaptations of the Section 404(b)(1) guidelines were made relative to this evaluation.

b. The purpose of this project is to create a safer navigation channel for towboats in the Mississippi River by reducing the strong drafting currents that presently exist. Continued towboat navigation through these hazardous Mississippi River bends increases the risk of an accident. Barges could break loose and block safe navigation of the river. Some barges could even sink. If hazardous or toxic materials are involved, serious concerns for public safety could arise. Adverse environmental impacts could also incur.

c. An Aquatic Resource Alteration Permit (Section 401 water quality certification) has been requested from the State of Tennessee.

d. The proposed project is not likely to adversely impact the endangered least tern, pallid sturgeon, or fat pocketbook pearly mussel. The U.S. Fish and Wildlife Service (USFWS) has been coordinated with, and requirements of Section 7 of the Endangered Species Act (ESA) have been fulfilled. However, obligations under Section 7 of the ESA will be reconsidered if new

information reveals that the proposed action may affect listed species in a manner or to an extent not previously considered, the proposed action is subsequently modified to include activities which were not considered during this review, or new species are listed or critical habitat designated that might be affected by the proposed action.

e. The proposed work will not significantly affect human health and welfare, the municipal water supply, or commercial or sport fishing. No long-term impacts on plankton communities; breeding, spawning, or nursery habitats; or shellfish areas are expected. There are no wetlands present in the unvegetated Mississippi River channel; however, it is still considered waters of the United States and subject to Clean Water Act regulations. No other special aquatic sites are located in the proposed work areas.

f. No significant adverse impacts to aquatic life or terrestrial wildlife, dependent on aquatic ecosystems, are expected.

g. The proposed work should not cause significant adverse impacts on ecosystem diversity, productivity, or stability.

h. No adverse impacts on recreational, aesthetic, or economic values are anticipated. The proposed work would create a safer navigation channel for towboats in the Mississippi River.

i. Construction of the bendway weirs will be carefully planned and executed. Contractors are required to maintain proper alignment of the weir structures. The fill material is clean limestone rock; thus, there will be minimal wash resulting from the placement of the stones. Contractors are also responsible for an approved environmental protection plan for the prevention/control of pollution and habitat disruption that may occur to the environment during construction.

j. The Memphis District Archaeologist checked records for sunken vessels in the project locations, and no records were revealed at either location. Since all work will be conducted from the river, no known sunken vessels are in the project locations, and no grading will be conducted on the bank, there is not a possibility of affecting a significant cultural resource. A letter has been sent to the Tennessee State Historic Preservation Officer (SHPO) discussing the project. No further cultural resource work will be required. However, if cultural remains are encountered during construction, all work would stop in the affected area and consultation will take place.

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